

**Nearshore habitat use by juvenile chinook salmon
in lentic systems of the Lake Washington basin
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Abstract

Nearshore areas of southern Lake Washington, southern Lake Sammamish, and the Ship Canal were surveyed for juvenile chinook salmon (*Oncorhynchus tshawytscha*) during winter and spring of 2001 to provide information on habitat use and its relationship to shoreline development. Juvenile chinook salmon are found in the lentic systems of the Lake Washington basin between January and July, primarily in the littoral zone. Little is known of their habitat use in lakes, as chinook salmon rarely occur in lakes throughout their natural distribution.

Data on chinook habitat use were collected primarily through snorkel surveys. Both day and night surveys were conducted. A variety of study elements were undertaken, which included: Gene Coulon index sites, random transects in south Lake Washington, woody debris surveys in Lake Sammamish, habitat manipulation experiments, and Ship Canal surveys.

Three index sites in Gene Coulon Park were repeatedly surveyed at night to examine temporal changes in juvenile chinook salmon abundance within the nearshore area. We used the same index sites as in 2000 sampling. In January and February, few chinook salmon were observed but in early March their abundance increased sharply. In late May, the number of juvenile chinook salmon declined abruptly and few were present in June. Juvenile chinook salmon appeared to move into somewhat deeper water in May and June. Chinook salmon abundance at index sites was unexpectedly high given the low spawner abundance.

Nighttime scuba diving was done once to survey deeper waters areas of the nearshore area for the occurrence of juvenile chinook salmon. Results indicated the vast majority of chinook salmon were in water less than a meter deep. Preliminary daytime observations indicated juvenile chinook salmon use water less than a meter deep in March and April but use increasingly deeper water in May and June.

Day and night random 100-m transects were sampled during two time periods, February-March and April-May; however, few fish were observed during April-May daytime surveys. Based on electivity indices, chinook salmon selected sand and gravel habitats during both day and night throughout the sampling period. During the February-March time period, chinook salmon appeared to commonly use some type of overhead structure during the day but rarely used them at night. During both time periods, day and night, the percent of chinook salmon along armored banks (bulkheads and rip rap) was relatively low compared to the percent of shoreline that had armored banks.

We conducted an assessment of the use of woody debris and overhanging vegetation in Lake Sammamish because there was little of these habitat types in south Lake Washington. Once in March and once in May, three sites with woody debris and overhanging vegetation were compared to three open sites lacking these cover types. During the day, there was no significant difference between woody debris sites and open sites, however woody debris sites had a higher overall density of chinook salmon than open sites. At night, significantly more chinook salmon were in open sites than woody debris sites.

Preliminary habitat manipulation tests were conducted in Gene Coulon Park to experimentally test the use of woody debris and overhead structures. Experiments were conducted in April and May in areas where chinook salmon were known to be abundant. Two

sites with structure added were compared to two control sites where no structures were added. Overall, there was no difference between woody debris and control sections during the day or night. However, during the first three dates these sites were monitored during the day, substantially more chinook salmon were present in woody debris sites than in control sites. Chinook salmon appeared to avoid overhead structures during the day and night. Habitat manipulation experiments allowed us to examine some habitat characteristics of juvenile chinook salmon under more controlled conditions and should be considered for future investigations.

Six sites were surveyed in June in the Ship Canal area to determine the effectiveness of snorkeling to gather habitat use information in this area. Few chinook salmon were observed considering the large number of migrating fish. Overall, snorkeling did not appear to be effective in determining chinook habitat use in the Ship Canal.